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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/796,806
Filing Date	3/9/04
First Named Inventor	Mabe
Art Unit	3676
Examiner Name	Williams
Total Number of Pages in This Submission	
Attorney Docket Number	7784-000704US

ENCLOSURES ***(check all that apply)***

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment / Reply
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  - ☐ Affidavits/declaration(s)
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- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
  - ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawing(s)
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- ☐ Status Letter
- ☒ Other Enclosure(s) *(please identify below)*:

  Appeal Brief

Remarks The Commissioner is hereby authorized to charge any additional fees that may be required under 37 CFR 1.16 or 1.17 to Deposit Account No. 08-0750. A duplicate copy of this sheet is enclosed.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm *or* Individual name	Harness, Dickey & Pierce, P.L.C.	Attorney Name Mark D. Elchuk	Reg. No. 33,686
Signature	Mark D. Elchuk		
Date	September 22, 2006		

CERTIFICATE OF TRANSMISSION/MAILING

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EV 757 777 975 US

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	10/796,806
Filing Date:	March 9, 2004
Applicant:	James H. Mabe
Group Art Unit:	3676
Examiner:	Mark A. Williams
Title:	HINGE APPARATUS WITH TWO-WAY CONTROLLABLE SHAPE MEMORY ALLOY (SMA) HINGE PIN ACTUATOR AND METHODS OF MAKING TWO-WAY SMA PARTS
Attorney Docket:	7784-000704US

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AMENDED APPEAL BRIEF
UNDER 37 C.F.R. § 41.37

Sir:

The presently amended brief is being submitted in response to the Notice mailed on August 23, 2006.

APPELLANT'S BRIEF ON APPEAL

Pursuant to 37 C.F.R. § 41.37, this Brief on Appeal is submitted as follows:

REAL PARTY IN INTEREST – UNDER 37 C.F.R. § 41.37(c)(1)(i)

The real party in interest in this appeal is The Boeing Company, a corporation of the State of Delaware, having its principal place of business at 100 North Riverside Plaza, Chicago, Illinois 60606-1596, by virtue of an assignment recorded August 23, 2003 at Reel 013236, Frame 0096.

RELATED APPEALS & INTERFERENCES - UNDER 37 C.F.R. § 41.37(c)(1)(ii)

To the best of Appellant's knowledge, no other appeals or interferences are pending which will directly affect, be directly affected by or have a bearing on the Board's decision in the present pending appeal.

STATUS OF THE CLAIMS – UNDER 37 C.F.R. § 41.37(c)(1)(iii)

On May 1, 2006, Appellant appealed from a final rejection of claims 35-45. A copy of the claims presently being appealed (i.e., Claims 35-45) is provided in the attached "Claims Appendix".

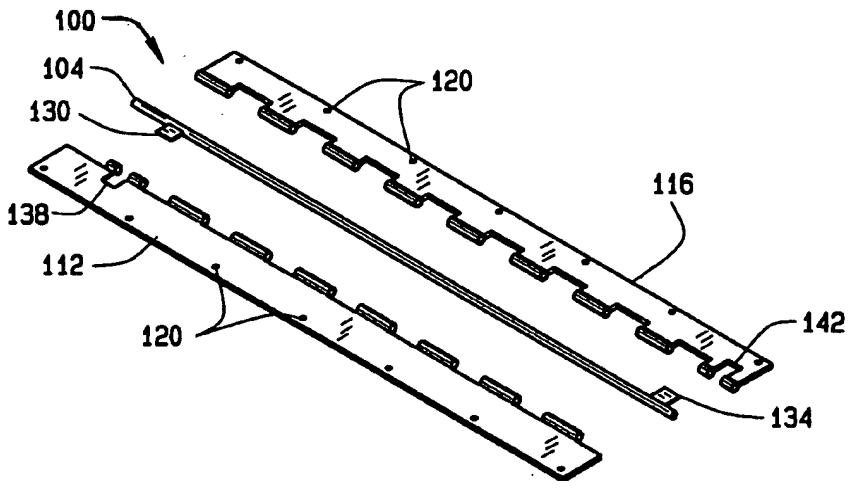
STATUS OF AMENDMENTS – UNDER 37 C.F.R. § 41.37(c)(1)(iv)

A final Office Action was mailed January 18, 2006. In response thereto, Appellant filed a Notice of Appeal on May 1, 2006. No other papers besides above-mentioned "Notice of Appeal", and the present appeal brief, have been submitted by the undersigned; therefore, there are no papers connected with the present application that remain "unentered" in the present application. There are no documents under 37 C.F.R. §§ 1.130, 1.131 or 1.132 that have been submitted by the Applicant during prosecution.

SUMMARY OF THE CLAIMED SUBJECT MATTER – UNDER 37 C.F.R. § 41.37(c)(1)(v)

Independent Claim 35

The present application discloses a hinge apparatus 100 having a pin 104 (p. 5, line 20; Fig. 1) comprising a two-way Shape Memory Alloy (SMA), with each end being coupled to generally opposed hinge leaf panels 112,116. (p. 5, line 21; Fig. 1). The hinge leaf panels cooperatively define a passage in which the two-way SMA pin 104 fits (Fig. 1) so that the two-way SMA pin 104 can couple the two hinge leaf panels 112,116 together. The SMA pin 104 at least partially twists when the SMA pin 104 changes between an austenite temperature and a martensite temperature (p. 6, lines 4-18). For convenience, Figure 1 of the present application is shown below.



A key-spline arrangement consists of tabs 130 and 134, opening 138 in hinge leaf 112, and opening 142 in hinge leaf 116 (p.5, lines 7-15 of paragraph 25, as amended in the Amendment filed July 8, 2005). Tab 130 engages with

opening 138 and tab 134 engages with opening 142 (p. 5, lines 7-15, as amended in the July 8, 2005 amendment; Figures 1 and 2) to provide a transfer of torque in both clockwise and counterclockwise directions from the two-way SMA pin 104 to one of the hinge leafs 112,116 relative to the other one of the hinge leafs 112,116 (p. 10, lines 18-27). Thus, the hinge leaf panels 112,116 pivot relative to one another upon a torque being applied by the twisting of the SMA hinge pin 104 as the temperature of the SMA pin 104 changes between the austenite and martensite temperatures (p. 10, lines 18-27).

Independent claim 41

A hinge 100 having a pin 104 (p. 5, line 20; Fig. 1) comprising a two-way Shape Memory Alloy (SMA), with each end being coupled to generally opposed hinge leaf panels 112,116. (p. 5, line 21; Fig. 1). The hinge leaf panels have knuckles (Figures 1 and 2) that define a passage into which the SMA hinge pin 104 fits (p. 5, lines 7-15 of amended paragraph 25, as amended by the Amendment filed July 8, 2005), with the SMA pin 104 being made of NITINOL® (p. 12, lines 15-17).

The SMA hinge pin 104 includes a first tab 130 at a first end of the SMA pin, a second tab 134 at a second end of the SMA pin 104, opening 138 in hinge leaf 112, and opening 142 in hinge leaf 116 (p.5, lines 7-15 of paragraph 25, as amended in the Amendment filed July 8, 2005). Tab 130 engages with opening 138 and tab 134 engages with opening 142 (p. 5, lines 7-15, as amended in the July 8, 2005 amendment; Figures 1 and 2) to provide a transfer of torque in both clockwise and counterclockwise directions from the two-way SMA pin 104 to one

of the hinge leafs 112,116 relative to the other one of the hinge leafs 112,116 (p. 10, lines 18-27). Thus, the hinge leaf panels 112,116 pivot relative to one another upon a torque being applied by the twisting of the SMA hinge pin 104 as the temperature of the SMA pin 104 changes between the austenite and martensite temperatures (p. 10, lines 18-27), and the torque generated by the SMA pin 104 is transferred to the hinge leaf panels 112,116 (p. 6, lines 8-13 and lines 27-29).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL – UNDER 37 C.F.R. § 41.37(c)(1)(vi)

Appellant presents the following ground of rejection for review:

Rejection 1: Whether claims 35-45 are indefinite under 35 U.S.C. §112, second paragraph.

Rejection 2: Whether claims 35, 36, 41-43, and 45 are anticipated under 35 U.S.C. § 102(b) by Japanese Patent JP 408228910A (JP '910).

Rejection 3: Whether Claims 37-45 are obviousness under 35 U.S.C §103 in view of JP '910.

ARGUMENT – UNDER 37 C.F.R. § 41.37(c)(1)(vii)

Pursuant to 37 C.F.R. § 41.37(c)(1)(vii), the following provides the contentions of Appellant with respect to each of the grounds of rejection enumerated above that are being presented for review in accordance with 37 C.F.R. § 41.37(c)(1)(vi).

Argument Regarding Rejection 1 under 35 U.S.C. §112, Second Paragraph

Claims 35-45 are not indefinite in view of the language added into independent claims 35 and 41. That language specifies, for example in independent claim 35, that "*the piano hinge does not freely pivot but pivots in response to the two–way SMA pin twisting as the temperature of the two-way SMA pin changes between the austenite temperature to the martensite temperature*" . From the drawings of Figures 1 and 2, it will be apparent that once the hinge 100 is secured to external structure, for example the supporting structure 128 having door 124 (p. 10, lines 13-17), the hinge 100 will not be able to freely rotate because of the tabs 130,134 engaging surfaces of the structure 128 and the door 124. The tabs 130,134 abutting against the surfaces of the structure 128 and the door 124 will prevent the SMA pin 104, and thus the hinge leafs 112,116 from "freely" rotating or pivoting. The hinge leafs 112,116 will only be able to pivot in response to the twisting of the SMA hinge pin 104. Thus, pivoting movement of the hinge 100 is controlled by the twisting action of the SMA pin 104 as it changes between its austenite and martensite temperatures.

In view of this, it is submitted that the rejection under 35 U.S.C §112, second paragraph, is improper, and that this rejection should be withdrawn.

Argument regarding Rejection 2 Under 35 U.S.C §102(b)

The JP '910 patent

The JP '910 patent is directed to a cooking bowl 1 having a cover 2 and a pot body 3. The cover 2 is pivotally attached to a plate 9, which is supported within an area 12 of the pot body 3. A pair of shape memory alloy (SMA) pins 7 are associated with the cover 2 and the plate 9. Ends 7c of the SMA pins 7 are formed to contact the plate 9. Ends 7b of the SMA pins 7 extend through openings in the cover 2. Heat generated during a cooking process heats the SMA pins 7, which causes them to twist, thus lifting the cover 2. After cooking is completed, and as the SMA pins 7 cool down, gravity causes the cover 2 to drop back down on to the body 3.

It will be noted that the SMA pins 7 are not fixedly secured at their ends 7c, which permits the cover 2 to be lifted without causing any twisting of the SMA pins 7. However, this coupling configuration does not allow the SMA pins 7 to positively urge the cover 2 back into its closed position.

The Claimed Subject Matter

Claim 35 recites that the end portions of the two-way SMA pin 104 of the present application are rigidly secured to the first and second hinge leafs 112,116. This allows for transfer of torque in both clockwise and counterclockwise directions from the two-way SMA pin 104 to one of the hinge

leafs 112,116, relative to the other of the hinge leafs. Thus, the hinge leafs 112,116 do not pivot about the SMA pin 104 , but rather pivot only when the two-way SMA pin 104 twists. Twisting occurs when the temperature of the two-way SMA pin 104 changes from the austenite temperature to the martensite temperature of the SMA material that comprises the SMA pin 104. Twisting of the SMA pin 104 also occurs when the temperature changes from the martensite temperature to the austenite temperature of the SMA material.

Claim 41 similarly recites that the first and second tabs at opposite end portions of the two-way SMA hinge pin 104 are rigidly secured to the respective first and second hinge leafs 112,116, such that the hinge leafs do not pivot about the SMA pin, but rather pivot when the two-way SMA hinge pin twists.

Differences Between JP '910 and the Claimed Subject Matter

It would be counter-intuitive for the pin 7 in JP '910 to be rigidly secured at both ends, because opening the cover 2 to put rice into the pot 3 would then require heating the pins 7 to cause the pins to twist and open the cover 2. The intention with the JP '910 device is to be able to manually pivot the cover 2 about the pins 7 (without twisting the pins) to permit placement of rice into the pot 3, before cooking begins. Gravity is also necessary to provide a force to act on the cover 2 to close the cover 2. As such, the cover 2 needs to be able to pivot without twisting the SMA pins 7. Since the SMA pins 7 are not rigidly secured to both the plate 9 and the cover 2 in the '910 patent, the SMA pins 7 **cannot apply a torque in both an opening direction and a closing direction.**

In the final Office Action, the Examiner has taken the position (in note 1; page 2) that the two-way SMA pins 7 in the '910 patent cause the hinge apparatus to apply a **closing force** to the device coupled to the hinge apparatus. This is simply incorrect. To the contrary, the SMA pins 7 in JP '910 can only twist to **provide an opening force**. Again, this is because the SMA pins 7 each have an end secured to the cover 2, but neither has an end rigidly secured to the plate 9 (the ends 7c only make contact with plate 9). Thus, the cover 2 may be pivoted about the pins 7 without twisting the pins 7, since the end of each pin 7 adjacent the plate 9 is not rigidly secured to the plate 9.

Importantly, and in contrast to the configuration of the JP '910 device, the ends of the claimed SMA pin 104 are rigidly secured to each hinge leaf 112,116. In this manner, the SMA pin 104 is able to provide a torque in either direction for pivoting the hinge leafs relative to each other when the SMA pin 104 twists, which occurs when the temperature of the SMA pin 104 changes between its austenite and martensite temperatures. The hinge leafs 112,116 of the claimed hinge apparatus 100 **do not pivot about the SMA pin 104**, but rather **pivot relative to each other when the SMA pin 104 twists to apply a torque in either rotational direction.**

Appellant further submits that it would not have been obvious to rigidly secure the hinge leafs 112,116 to the ends of the SMA pin 104, in view of the JP '910 patent, because with the JP '910 device, this would prevent clearly necessitate the individual working against the biasing force of the SMA pin 7 when opening the cover 3 to place uncooked food in the pot 3.

The hinge apparatus 100 of the present application, since it permits movement of the hinge leafs 112,116 only upon twisting of the SMA pin 104, and since the SMA pin 104 is able to apply a torque in two opposite rotational directions, enables applications that would not be feasible with the hinge structure of JP '910. For example, the hinge apparatus 100 can be used to replace a conventional hinge and mechanized actuator in a satellite, where gravity cannot be relied on to close a door. The hinge apparatus 100 would eliminate or reduce the need for a separate, conventional mechanized actuator to pivot a hinged door back into its initial position.

Rejection 3 Under 35 U.S.C §103

Claims 37-45 are also not obvious in view of JP '910, for the reasons set forth above in connection with the argument presented relative to the rejection under 35 U.S.C. §102(b). This is because modifying the device of JP '910 would destroy its intended purpose of being able to open the cover 2 to place food into the pot 3 before starting the cooking process. Put differently, if the cover 2 was not freely pivotable, but rather the cover 2 was held in a closed position relative to the pot 2 by the pins 7, then one would not be able to open the cover 3 to place food in the pot without the pins 7 first being caused to twist by a temperature change. Thus, using an arrangement such as presently claimed in independent claims 35 and 41, with the tabs (130 and 134; Figure 1 of the application) operating to control both opening and closing movement of the door (124; Figure 3 of the application), would actually render the cooking device in JP '910 completely unsuited for its intended purpose. It is well established that if a

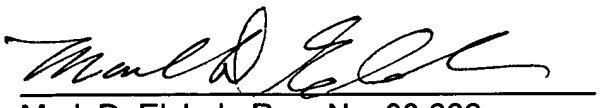
modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. ***In re Gordon***, 733 F.2d 900,221 USPQ 1125 (Fed. Cir. 1984) MPEP 2143.01. Additionally, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. ***In re Ratti***, 270 F.2d 810, 123 USPQ 349 (C.C.P.A. 1959) MPEP 2143.01.

Thus, the hinge in JP '910 absolutely requires the cover 2 to be able to pivot freely relative to the pot 3 at all times, with the twisting action of the pins 7 simply enabling the cover to be opened as the pins 7 reach a predetermined temperature. This is fundamentally different than the arrangement presented in independent claims 35 and 41, in which the hinge cannot be allowed to pivot freely unless pivoting of the hinge leafs 112,116 is caused by twisting of the SMA pin 104.

U.S. 5,617,377 (the "377 patent) has been cited to support the proposition that it is known in the art to use NITINOL® as the SMA material for the SMA pin 104. Simply using the teachings of the '377 patent relative to a specific material for the SMA pin does not overcome the fundamental differences explained above between JP '910 and the pending claims.

For these reasons, it is believed that the rejection under 35 U.S.C §103 of claims 37-45 is improper and should be withdrawn.

Respectfully submitted,



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CLAIMS APPENDIX

UNDER 37 C.F.R. § 41.37(c)(1)(viii)

35. A piano hinge defining a hinge line, the piano hinge comprising a two-way shape memory alloy (SMA) positioned along the hinge line to form a pin that at least partially twists when the two-way SMA pin changes between an austenite temperature and a martensite temperature, first and second hinge leafs defining a passage into which the two-way SMA pin fits, and a key-spline arrangement rigidly securing each respective end portion of the two-way SMA pin to the first and second hinge leafs respectively to provide for transfer of torque in both clockwise and counterclockwise directions from the two-way SMA pin to one of the hinge leafs relative to the other of said hinge leafs, whereby the piano hinge leafs do not pivot about the SMA pin but pivot when a torque is applied in response to the two-way SMA pin twisting as the temperature of the two-way SMA pin changes between the austenite temperature to the martensite temperature.

36. The piano hinge of claim 35, wherein the hinge leafs include alignable knuckles that define the passage into which the two-way SMA pin fits.

37. The piano hinge of claim 35, wherein the two-way SMA is configured to apply torque within a range of about 27 inch pounds and about 1740 inch pounds.

38. The piano hinge of claim 35, wherein the two-way SMA is configured to apply torque within a range of about 27 inch pounds and about 1010 inch pounds.

39. The piano hinge of claim 35, wherein the two-way SMA is configured to apply torque within a range of about 1010 inch pounds and 1740 inch pounds.

40. The piano hinge of claim 35, wherein the two-way SMA is configured to apply torque at about 1740 inch pounds.

41. A piano hinge comprising first and second hinge leafs having alignable knuckles that define a passage into which a hinge pin fits, a two-way shape memory alloy (SMA) hinge pin at least partially disposed within the passage defined by the knuckles, the two-way SMA hinge pin being made of a NiTinol alloy and having at least a first tab at one end portion of the two-way SMA hinge pin rigidly secured to the first hinge leaf and at least a second tab at an opposite end portion of the two-way SMA hinge pin rigidly secured to the second hinge leaf such that the piano hinge leaves do not pivot about the SMA pin but pivot when a torque is applied as the two-way SMA hinge pin at least partially twists when the two-way SMA hinge pin changes between an austenite temperature and a martensite temperature of the NiTinol alloy, such that torque

generated by the two-way SMA hinge pin in either a clockwise or counterclockwise direction is transferred to one of the hinge leafs relative to the other of said hinge leafs, whereby the piano hinge pivots in response to the two-way SMA hinge pin twisting as the temperature of the two-way SMA hinge pin changes between the austenite temperature and the martensite temperature_.

42. The piano hinge of claim 41, wherein the first tab is at one end portion of the two-way SMA hinge pin and the second tab is at the other end portion of the two-way SMA hinge pin, such that the partial twisting of the hinge pin applies a torque to the first tab relative to the second tab.

43. The piano hinge of claim 42, wherein the hinge pin rotates into an intermediate partially twisted configuration when a temperature of the two-way SMA is between the austenite temperature and the martensite temperature.

44. The piano hinge of claim 43, wherein the two-way SMA is configured to apply torque within a range of about 27 inch pounds and about 1740 inch pounds.

45. The hinge apparatus of claim 43, further comprising a device to cause the hinge pin to heat and switch the two-way SMA between at a first trained shape and a second trained shape.

Evidence Appendix

Under 37 C.F.R. §41.37 (c)(1)(ix)

None

RELATED PROCEEDINGS APPENDIX

Under 37 C.F.R. §41.37(c)(1)(x)

None.